Political and institutional determinants of the tax mix

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POLITICAL AND INSTITUTIONAL DETERMINANTS OF THE TAX MIX: AN EMPIRICAL INVESTIGATION FOR OECD COUNTRIES*

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January 1999

SOM theme C: Growth and Coordination of Economies
SOM theme E: Financial Markets and Institutions

Abstract

Modern tax systems show a mix of direct and indirect taxes. However, it is difficult – if not impossible – to explain actual tax systems on the basis of optimality conditions. Political and institutional factors are sometimes argued to explain the presence of very complex tax structures. We propose various hypotheses that relate the tax structure to some political and institutional explanatory variables. The hypotheses are tested by applying panel data analysis on a large sample of OECD countries for the period 1965 to 1995. We conclude that political and institutional variables do not substantially influence the actual shape of the tax structure. However, unstable regimes have a higher tax burden.

JEL classification: E62, H61, H87
Keywords: political economy, fiscal policy, tax mix, tax ratio

*Previous versions of this paper have been presented at the 1997 SOM PhD. conference in Groningen, at a 1997 CCSO seminar, at the 1998 meeting of the European Public Choice Society in Göteborg, Sweden, and at the 1998 NAKE day, Amsterdam. We would like to thank the participants of these meetings, and especially John Ashworth, Bruno Heyndels and Carla Marchese for their valuable comments. The usual disclaimer applies.

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1 Introduction

The economies of the OECD countries have developed from minimalist states, relying mainly on indirect taxation, to modern welfare states. Income taxes were introduced at the end of the 19th century, and quickly increased in importance. The growing pressure for redistribution and the need to raise more revenues by the first world war induced a rise in the relative share of income taxation. This process continued during the depression in the early 1930s and the second world war. Although social insurance taxation had already been introduced at the start of the twentieth century in most countries, the massive rise in revenues from this source began with the build up of the welfare state in the 1960s. Due to the heavy reliance on visible taxes, the share of indirect taxation began to rise again after the 1960s, especially since the introduction of VAT (Peters 1991).

Significant differences in the design of revenue systems and in the use of tax instruments exist among developed nations. Traditionally, public finance has focused on normative questions, often within a framework that makes no allowance for political institutions (Hettich and Winer, 1997). However, it is difficult – if not impossible – to explain actual tax systems on the basis of this approach (alone). More recently, some studies have suggested the importance of political and institutional factors in explaining the presence of very complex tax structures. Winer and Hettich (1998) point out that omission of collective choice prevents the analyst from understanding the central role of political equilibrium in the analysis of taxation. So far, however, these studies have not yielded a fully developed framework that allows for empirical testing. We therefore propose various hypotheses that relate the tax structure to some political-institutional explanatory variables. The hypotheses are tested by applying panel data analysis on a large sample of OECD

countries for the period 1965 to 1995.

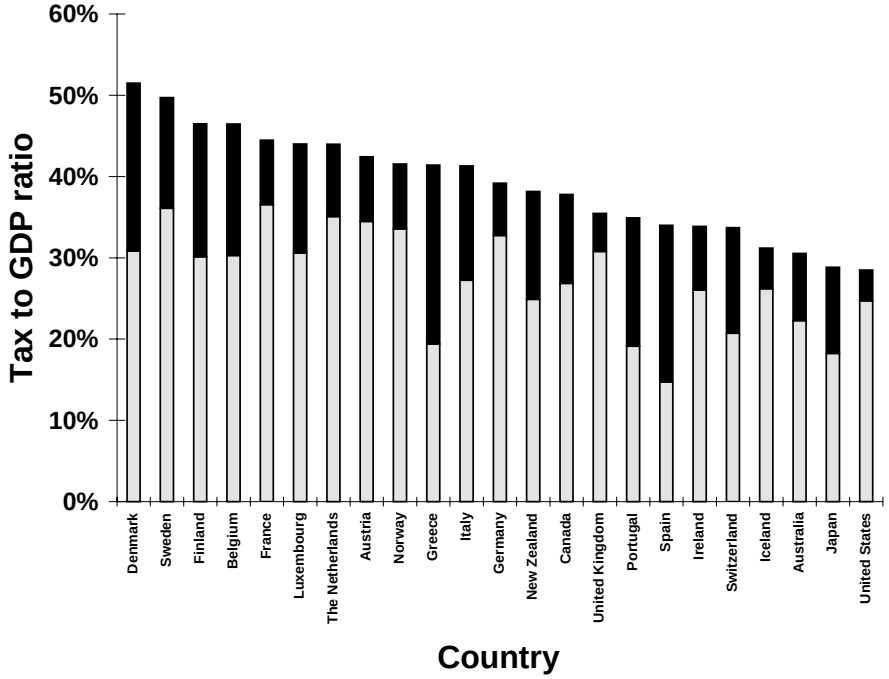
Explanations for existing variations in the tax mix have received only scant attention in the literature, which is rather surprising, given the importance nowadays of tax reforms that often boil down to changing the tax mix. Furthermore, various recent studies have suggested that the tax mix affects economic performance. Mendoza et al. (1994), for example, find that the tax rate on capital income is generally negatively correlated with investment, whereas high consumption and labour income taxes coincide with less hours worked. A high level of taxes on labour income is believed to increase unemployment. According to Daveri and Tabellini (1997) labour taxes have a strong positive effect on unemployment in Europe. The observed rise of about 9 percentage points in the labour tax rate corresponds to a rise in unemployment of about 4 percentage points. Widmalm (1998) finds that a higher relative reliance on (progressive) income taxation has a negative impact on economic growth. Other variables (wage taxes, consumption taxes, corporate income taxes and property taxes) do not have a negative impact on growth.

The paper is structured as follows. Section 2 offers a review of trends in tax levels and the tax mix. The third section provides a review of the scant literature in this field, while in section 4 our models and hypotheses are formulated. Section 5 shows the empirical results. The final section offers some concluding comments.

2 The tax ratio and the tax mix

This section describes some general patterns concerning the tax ratio (total taxes in relation to GDP) and the tax structure in OECD countries between

Figure 1: Tax-to-GDP ratios in OECD Countries, 1965-1995



1965 and 1995. We start with the total tax ratio.[1] Figure 1 presents the ratio of total taxes to GDP in 1965 (grey shaded) and the increase towards its level in 1995. The countries are ranked according to the tax ratio in 1995. It follows from Figure 1 that in 1965 a number of less industrialised European countries (Greece, Portugal, Spain) and Japan had the lowest tax ratios, whereas some non-European countries (Australia, Canada, US) plus Switzerland had medium total tax ratios. Most industrialised European countries had high

[1]One important caveat has to be made when tax ratios of various countries are compared. So-called tax expenditures are the most important incomparability in quantitative terms in tax burden comparisons. One country may place a heavy reliance on tax expenditures (subsidies paid out via the tax system) whilst another may rely predominantly on direct expenditures to achieve similar goals (Messere, 1993).

ratios. In 1995 all countries had a higher tax burden than in 1965. However, compared to 1965 the distribution pattern has changed somewhat in 1995. The most notable difference is the position of the less industrialised European countries. The total tax ratios in these countries have come to exceed those of Australia, Japan, Switzerland and the United States.

Comparing data of only two years may distract attention from changes over time. Table 1 therefore shows the level of taxation for 1965, 1970, 1975, 1980, 1985, 1990 and 1995. The ranking of the countries is shown in parentheses. It follows from Table 1 that the average total tax burden across the OECD (both weighted and unweighted) has continued to rise until the mid 1990s. However, the rate of increase in the 1980s and early 1990s was less than that of the 1970s. Moreover, in some countries the tax burden fell between 1985 and 1995. For instance, in Sweden the tax ratio dropped considerably, albeit that the ranking of Sweden is still very high. It also follows that the tax ratio in the Southern European countries started to rise only during the 1980s. Finally, it is interesting that apart from Greece, Portugal, and Spain the ranking of some other countries also changed considerably. In comparison to 1965, Belgium, Denmark and Finland moved upwards – *i.e.* their relative tax ratio increased –, while the ranking of Germany, Iceland, the UK and the US is substantially lower in 1995 than in 1965, although their absolute total tax ratios increased over the period.

So in conclusion, it follows from Table 1 that there has been much diversity in the movement of countries' particular tax ratios over the last 30 years with relatively little change in some countries and violent changes in others. It is one of the purposes of the paper to examine which factors might explain this variation across countries and within countries over time.

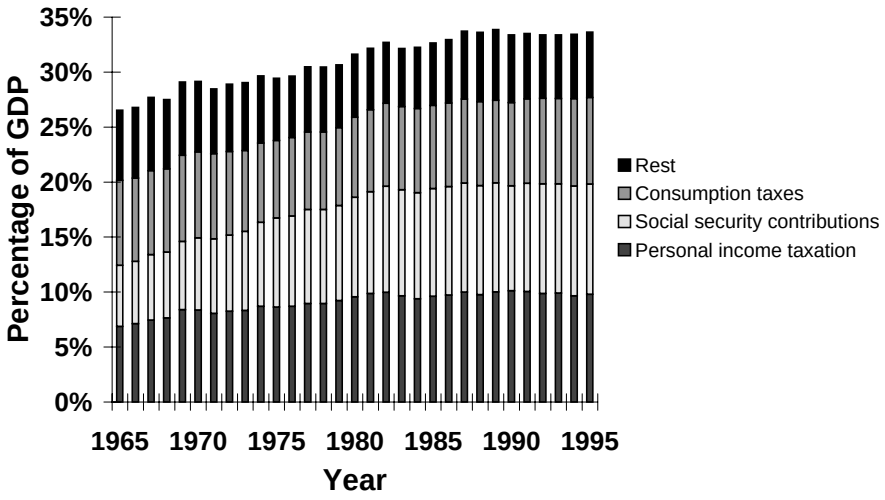
Over the last three decades around 85 per cent of revenues usually came from three sources: personal income taxes, social security contributions and

Table 1: Tax level as a percentage of GDP 1965-1995

	1965		1970		1975		1980		1985		1990		1995	
Denmark	30.83%	(7)	40.39%	(2)	41.35%	(5)	45.48%	(5)	49.03%	(2)	48.73%	(2)	51.48%	(1)
Sweden	36.10%	(2)	40.58%	(1)	43.88%	(2)	49.36%	(1)	50.31%	(1)	55.59%	(1)	49.69%	(2)
Finland	30.13%	(11)	32.18%	(11)	35.31%	(11)	32.95%	(13)	37.38%	(11)	45.39%	(3)	46.49%	(3)
Belgium	30.28%	(10)	35.29%	(8)	41.06%	(6)	43.50%	(6)	47.50%	(3)	44.83%	(3)	46.47%	(4)
France	36.53%	(1)	35.43%	(7)	37.04%	(8)	41.71%	(7)	44.46%	(5)	43.71%	(6)	44.48%	(5)
Luxembourg	30.60%	(9)	31.99%	(12)	42.88%	(4)	45.99%	(3)	45.35%	(4)	43.35%	(7)	43.99%	(6)
The Netherlands	35.06%	(3)	39.81%	(3)	43.66%	(3)	45.82%	(4)	44.13%	(6)	44.58%	(5)	43.96%	(7)
Austria	34.46%	(4)	35.67%	(6)	38.64%	(7)	41.17%	(8)	43.05%	(8)	41.28%	(9)	42.43%	(8)
Norway	33.56%	(5)	38.98%	(4)	44.82%	(1)	47.09%	(2)	43.38%	(7)	41.80%	(8)	41.54%	(9)
Greece	19.37%	(20)	23.97%	(20)	24.64%	(21)	29.38%	(17)	35.12%	(13)	37.53%	(12)	41.40%	(10)
Italy	27.25%	(12)	27.91%	(15)	25.14%	(19)	29.97%	(16)	34.52%	(14)	39.12%	(10)	41.31%	(11)
Germany	32.73%	(6)	32.80%	(9)	35.73%	(9)	38.00%	(9)	38.11%	(9)	36.66%	(14)	39.18%	(12)
New Zealand	24.88%	(16)	26.69%	(17)	31.29%	(13)	33.03%	(12)	33.25%	(16)	37.65%	(11)	38.16%	(13)
Canada	26.84%	(13)	32.67%	(10)	33.84%	(12)	32.83%	(14)	33.87%	(15)	36.81%	(13)	37.78%	(14)
United Kingdom	30.78%	(8)	37.69%	(5)	35.45%	(10)	35.32%	(10)	37.81%	(10)	36.51%	(15)	35.46%	(15)
Portugal	19.12%	(21)	25.63%	(18)	24.72%	(20)	28.69%	(20)	27.82%	(23)	31.01%	(21)	34.92%	(16)
Spain	14.73%	(23)	17.31%	(23)	19.59%	(23)	24.07%	(23)	28.78%	(19)	34.40%	(17)	33.98%	(17)
Ireland	26.04%	(15)	31.23%	(13)	28.90%	(16)	34.04%	(11)	36.41%	(12)	35.21%	(16)	33.86%	(18)
Switzerland	20.71%	(19)	23.81%	(21)	29.61%	(14)	30.78%	(15)	32.00%	(17)	31.50%	(19)	33.70%	(19)
Iceland	26.20%	(14)	27.00%	(16)	29.60%	(15)	29.20%	(18)	28.43%	(20)	31.43%	(20)	31.19%	(20)
Australia	22.26%	(18)	25.38%	(19)	27.76%	(17)	28.76%	(19)	29.93%	(18)	30.76%	(22)	30.53%	(21)
Japan	18.23%	(22)	19.45%	(22)	21.52%	(22)	26.00%	(22)	27.96%	(22)	31.52%	(18)	28.83%	(22)
United States	24.70%	(17)	28.44%	(14)	27.48%	(18)	28.58%	(21)	28.24%	(21)	27.67%	(23)	28.49%	(23)
Unw. Av.	27.45%		30.88%		33.21%		35.73%		37.25%		38.57%		39.10%	
Weight. Av.	26.53%		29.16%		29.45%		31.63%		32.65%		33.38%		33.63%	

Note: weighted average by PPP value of GDP, data for 1970-1995, OECD National Accounts, for 1965-1969, Summers and Heston, Penn World Tables, 5.6. The ranking is shown between brackets.

Figure 2: Tax-mix as a percentage of GDP, weighted by PPP-value of GDP, 23 OECD countries, 1965-1995



consumption taxes (Messere, 1993). In our analysis of the tax mix, we therefore focus on these three categories.[2] The remaining taxes are included in the rest category.

There are two ways to describe developments in the tax mix, depending on whether GDP is used as scaling factor or total tax revenues. In this paper we use GDP as scaling factor. The OECD generally only publishes unweighted figures, but this of course implies that Luxembourg, say, gets the same weight as the US. We therefore prefer weighted averages. Figure 2 shows the weighted average of the shares of the four types of tax revenues singled out above, using GDP as scaling factors.

[2]However, in recent discussions on (reforms of) tax systems is has very often been argued that due to tax competition the ability of governments to tax mobile bases has become more difficult over time. This trend, so it is said, will only increase in the future. Property is generally considered to be immobile, so one would expect the relative importance property taxes to increase over time. The data do not show this pattern, however.

Based on unweighted OECD averages, Messere (1993) argued that between 1965 and 1975 there was a considerable increase in the personal income tax and / or social security ratio in most OECD countries, accompanied by a scarcely changing tax ratio of taxes on goods and services. After the mid-seventies, however, general consumption tax ratios tended to increase. It follows from Figure 2 that this pattern is also visible, albeit less clearly, if weighted data are used. No matter whether weighted or unweighted data are used, the growth in social security contributions is quite remarkable; by 1995 they nearly raised as much revenue as the personal income tax. This shift probably reflects the growing pressures on social security expenditure from higher levels of unemployment, the ageing of the population and other social changes (Owens, 1997).[3]

In the 1980s many countries had some kind of tax reform. The most profound of the recent developments in tax reform was the dramatic and widespread reduction in marginal income tax in the 1980s, reflecting a reduction of the number of tax brackets, increased exemptions and adjusted thresholds. To broaden the base of the income tax more elements were regarded as income and some tax expenditures were eliminated. While top rates of the personal income tax have come down, revenues have not fallen anywhere near. In 1995, personal income tax revenues were 11.7 percent of GDP across the OECD area, compared with 11.3 percent in 1980. The reason is that many governments financed rate cuts with substantial base broadening (Owens, 1997). Countries with developed tax systems discovered it was difficult to expand the base of the income tax further, so two additional strategies emerged. One was to change the tax mix by switching to consumption taxes and higher social security taxes to supplement the income tax. The

[3]Although not shown in the figure, it is also interesting to note that the property tax ratio declined somewhat during the 1970s and the beginning of the 1980s; afterwards the share of property taxes in GDP rose to about its level in 1965.

other was a renewed interest in enhancing the administration of the taxes (Owens, 1997).

There is not only variation over time, also between countries the share of the three most important taxes differs considerably. Tables 2A-2C show the shares of the three most important revenue sources in all OECD countries between 1965-1995, again using GDP as scaling factor. It follows from table 2A that in 1995 personal income taxation as a share of GDP ranges between 4.9% (Greece) and 27.7% (Denmark). Here again some notable changes in terms of ranking occurred between 1965 and 1995. Whereas Belgium, Canada, Italy, and Ireland moved upwards – that is got relatively higher tax ratios – Austria, Luxembourg, the Netherlands, Norway, and the UK got a considerably lower ranking.

Table 2B reinforces the conclusion with respect to social security contributions which rose between 1965 and 1995 in all countries except Denmark, where social security was increasingly financed through other taxes. Also note that Australia and New Zealand do not levy social security contributions at all. Notable changes in relative terms took place in Finland (upwards), and Luxembourg, Norway, and the UK (downwards).

It follows from table 2C that notable changes in ranking with respect to the ratio of taxes on goods and services occurred in Greece, Portugal, New Zealand, Spain (upwards) and in Austria, Canada, Denmark, France, Germany, Italy, (downwards).

3 Review of the literature

Most of the literature on taxation is based on 'optimal taxation' principles.[4] Ramsey (1927) was one of the first to derive optimality conditions for com-

[4]Musgrave (1969) has written extensively on the structure of the tax system, but mainly in the context of developing countries.

Table 2: Taxation as percentage of GDP in 23 OECD countries, 1965-1995

A Personal income taxation as a percentage of GDP 1965-1995

	1965		1970		1975		1980		1985		1990		1995	
Denmark	11.81%	(2)	20.76%	(1)	23.12%	(1)	23.55%	(1)	24.61%	(1)	25.61%	(1)	27.65%	(1)
New Zealand	9.83%	(4)	11.34%	(6)	16.99%	(4)	20.35%	(2)	19.90%	(2)	17.77%	(3)	23.13%	(2)
Sweden	16.14%	(1)	20.24%	(2)	20.25%	(2)	20.26%	(3)	19.38%	(3)	21.41%	(2)	17.53%	(3)
Finland	9.67%	(6)	13.47%	(4)	17.01%	(3)	14.73%	(5)	17.57%	(4)	17.49%	(4)	16.19%	(4)
Belgium	6.31%	(14)	8.58%	(12)	13.11%	(7)	15.29%	(4)	16.22%	(5)	14.26%	(6)	14.62%	(5)
Canada	6.18%	(15)	10.58%	(8)	11.11%	(11)	11.20%	(11)	11.93%	(8)	15.08%	(5)	14.11%	(6)
Australia	7.56%	(10)	9.41%	(10)	12.00%	(8)	12.64%	(7)	13.62%	(6)	13.22%	(7)	12.39%	(7)
Italy	3.03%	(21)	3.07%	(21)	3.81%	(21)	6.91%	(17)	9.23%	(16)	10.28%	(14)	10.81%	(8)
Norway	10.61%	(3)	13.81%	(3)	14.15%	(5)	13.18%	(6)	9.66%	(15)	10.95%	(10)	10.75%	(9)
Germany	8.20%	(8)	8.73%	(11)	10.79%	(12)	11.26%	(10)	10.92%	(11)	10.10%	(16)	10.70%	(10)
Switzerland	6.45%	(13)	7.91%	(13)	10.69%	(13)	10.96%	(12)	11.17%	(10)	10.82%	(11)	10.63%	(11)
Ireland	4.42%	(18)	5.74%	(17)	5.30%	(17)	10.89%	(13)	11.39%	(9)	11.24%	(8)	10.38%	(12)
United States	7.46%	(11)	10.01%	(9)	9.07%	(14)	10.54%	(14)	10.08%	(12)	10.42%	(12)	10.36%	(13)
United Kingdom	9.58%	(7)	11.85%	(5)	13.56%	(6)	10.38%	(15)	10.03%	(13)	10.41%	(13)	9.73%	(14)
Iceland	5.10%	(16)	5.40%	(18)	6.00%	(16)	6.70%	(18)	5.60%	(22)	8.30%	(19)	9.70%	(15)
Luxembourg	7.59%	(9)	7.58%	(14)	11.91%	(9)	12.34%	(8)	11.95%	(7)	10.21%	(15)	9.38%	(16)
Portugal	4.99%	(17)	6.22%	(16)	4.31%	(20)	5.66%	(20)	7.16%	(18)	7.96%	(20)	9.18%	(17)
Austria	7.07%	(12)	7.53%	(15)	8.36%	(15)	9.55%	(16)	9.87%	(14)	8.64%	(17)	8.85%	(18)
The Netherlands	9.78%	(5)	10.64%	(7)	11.81%	(10)	12.03%	(9)	8.56%	(17)	11.01%	(9)	8.31%	(19)
Spain	2.11%	(22)	1.98%	(23)	2.84%	(22)	4.90%	(22)	5.66%	(21)	7.47%	(21)	8.09%	(20)
Japan	4.01%	(19)	4.26%	(19)	5.14%	(18)	6.32%	(19)	6.92%	(19)	8.46%	(18)	6.17%	(21)
France	3.69%	(20)	4.06%	(20)	4.51%	(19)	5.38%	(21)	5.68%	(20)	5.18%	(23)	6.16%	(22)
Greece	1.31%	(23)	2.45%	(22)	2.27%	(23)	4.38%	(23)	4.87%	(23)	5.23%	(22)	4.90%	(23)
Unw. Av.	7.08%		8.94%		10.35%		11.28%		11.39%		11.81%		11.73%	
W. Av.	6.87%		8.36%		8.62%		9.56%		9.61%		10.12%		9.78%	

Note: The ranking is shown between brackets. Source: OECD *Revenue Statistics*.

B Social security contributions as a percentage of GDP 1965-1995

	1965		1970		1975		1980		1985		1990		1995	
France	13.59%	(1)	12.90%	(2)	15.12%	(2)	17.81%	(1)	19.26%	(2)	19.26%	(1)	19.28%	(1)
The Netherlands	10.89%	(2)	13.90%	(1)	16.76%	(1)	17.43%	(2)	19.53%	(1)	16.67%	(2)	18.39%	(2)
Germany	9.61%	(4)	9.96%	(5)	11.97%	(5)	13.06%	(6)	13.92%	(4)	13.74%	(5)	15.42%	(3)
Belgium	9.21%	(6)	10.74%	(3)	13.09%	(3)	13.23%	(5)	15.70%	(3)	15.17%	(3)	15.40%	(4)
Austria	8.75%	(7)	8.99%	(7)	10.66%	(8)	12.73%	(7)	13.69%	(5)	13.57%	(6)	15.37%	(5)
Sweden	5.63%	(9)	6.12%	(12)	8.56%	(11)	14.21%	(3)	12.47%	(7)	15.14%	(4)	14.46%	(6)
Greece	5.16%	(10)	6.25%	(10)	6.70%	(14)	9.66%	(11)	12.49%	(6)	11.67%	(10)	13.90%	(7)
Italy	9.31%	(5)	10.54%	(4)	11.53%	(6)	11.39%	(9)	11.98%	(8)	12.88%	(7)	13.08%	(8)
Finland	3.54%	(16)	2.89%	(18)	3.05%	(19)	3.14%	(19)	3.39%	(19)	9.87%	(13)	12.85%	(9)
Switzerland	4.66%	(12)	5.58%	(13)	8.64%	(10)	9.51%	(12)	10.25%	(11)	10.36%	(12)	12.59%	(10)
Spain	4.16%	(13)	6.48%	(8)	9.30%	(9)	11.69%	(8)	11.89%	(9)	12.18%	(8)	12.31%	(11)
Luxembourg	9.85%	(3)	9.32%	(6)	12.67%	(4)	13.45%	(4)	11.44%	(10)	11.83%	(9)	11.79%	(12)
Japan	3.48%	(17)	3.72%	(16)	6.24%	(15)	7.57%	(14)	8.46%	(13)	9.14%	(14)	10.48%	(13)
Norway	6.81%	(8)	6.30%	(9)	11.14%	(7)	9.90%	(10)	8.93%	(12)	10.99%	(11)	9.77%	(14)
Portugal	4.02%	(15)	6.21%	(11)	8.54%	(12)	8.47%	(13)	7.21%	(15)	8.42%	(15)	9.43%	(15)
United States	4.05%	(14)	5.49%	(14)	6.73%	(13)	7.50%	(15)	8.30%	(14)	7.15%	(16)	7.17%	(16)
Canada	1.52%	(21)	3.11%	(17)	3.40%	(18)	3.46%	(18)	4.56%	(18)	5.28%	(18)	6.34%	(17)
United Kingdom	4.74%	(11)	5.45%	(15)	6.16%	(16)	5.88%	(16)	6.67%	(16)	6.22%	(17)	6.29%	(18)
Ireland	1.69%	(20)	2.57%	(19)	4.35%	(17)	4.86%	(17)	5.37%	(17)	5.23%	(19)	4.88%	(19)
Iceland	2.10%	(19)	2.20%	(20)	0.80%	(20)	0.60%	(21)	0.70%	(21)	1.00%	(21)	2.50%	(20)
Denmark	2.76%	(18)	0.49%	(21)	0.55%	(21)	0.82%	(20)	1.86%	(20)	1.50%	(20)	1.60%	(21)
Australia	0.00%	(22)	0.00%	(22)	0.00%	(22)	0.00%	(22)	0.00%	(22)	0.00%	(22)	0.00%	(22)
New Zealand	0.00%	(23)	0.00%	(23)	0.00%	(23)	0.00%	(23)	0.00%	(23)	0.00%	(23)	0.00%	(23)
Unw. Av.	5.46%		6.05%		7.65%		8.54%		9.05%		9.45%		10.14%	
W. Av.	5.56%		6.55%		8.11%		9.05%		9.78%		9.53%		10.03%	

Note: The ranking is shown between brackets. Source: OECD *Revenue Statistics*.

C Taxation on goods and services as a percentage of GDP, 1965-1995

	1965		1970		1975		1980		1985		1990		1995	
Greece	9.16%	(15)	12.21%	(9)	11.91%	(8)	12.12%	(9)	15.00%	(5)	16.50%	(1)	16.78%	(1)
Denmark	12.48%	(7)	15.64%	(4)	13.91%	(4)	17.00%	(2)	16.77%	(2)	16.38%	(2)	16.70%	(2)
Norway	13.61%	(3)	16.45%	(2)	16.85%	(2)	16.68%	(3)	16.27%	(3)	14.86%	(5)	16.03%	(3)
Iceland	16.40%	(1)	16.60%	(1)	18.60%	(1)	17.50%	(1)	17.40%	(1)	16.20%	(3)	15.20%	(4)
Portugal	7.66%	(16)	10.24%	(16)	10.07%	(13)	12.88%	(6)	11.91%	(10)	13.59%	(8)	15.20%	(5)
Ireland	13.72%	(2)	16.36%	(3)	14.67%	(3)	14.88%	(4)	16.17%	(4)	14.88%	(4)	13.80%	(6)
Finland	13.11%	(5)	13.31%	(6)	12.10%	(7)	12.81%	(7)	13.53%	(7)	14.81%	(6)	13.79%	(7)
New Zealand	6.89%	(19)	7.37%	(18)	7.58%	(18)	7.36%	(19)	7.70%	(20)	12.64%	(10)	12.70%	(8)
United Kingdom	10.18%	(13)	10.78%	(12)	9.00%	(15)	10.37%	(14)	11.80%	(11)	11.26%	(14)	12.31%	(9)
France	13.46%	(4)	13.45%	(5)	12.17%	(6)	12.69%	(8)	13.19%	(9)	12.42%	(11)	12.14%	(10)
Sweden	11.50%	(8)	11.41%	(10)	10.68%	(11)	11.85%	(10)	13.31%	(8)	13.88%	(7)	12.07%	(11)
Belgium	11.36%	(9)	12.35%	(8)	10.85%	(9)	11.40%	(12)	11.69%	(12)	11.69%	(13)	12.03%	(12)
The Netherlands	9.66%	(14)	11.01%	(11)	10.55%	(12)	11.57%	(11)	11.32%	(13)	11.77%	(12)	12.03%	(13)
Luxembourg	7.55%	(18)	6.56%	(19)	8.95%	(16)	9.70%	(16)	10.87%	(14)	10.76%	(16)	11.94%	(14)
Austria	12.89%	(6)	13.29%	(7)	13.34%	(5)	12.98%	(5)	14.02%	(6)	13.00%	(9)	11.75%	(15)
Italy	10.59%	(11)	10.64%	(13)	7.38%	(19)	7.93%	(18)	8.76%	(18)	10.96%	(15)	11.26%	(16)
Germany	10.41%	(12)	10.42%	(14)	9.68%	(14)	10.30%	(15)	9.77%	(16)	9.80%	(17)	10.89%	(17)
Spain	6.02%	(21)	6.21%	(21)	4.73%	(22)	4.98%	(21)	8.26%	(19)	9.76%	(18)	9.74%	(18)
Canada	11.10%	(10)	10.32%	(15)	10.83%	(10)	10.68%	(13)	10.77%	(15)	9.52%	(19)	9.65%	(19)
Australia	7.64%	(17)	8.09%	(17)	8.01%	(17)	8.94%	(17)	9.76%	(17)	8.56%	(20)	8.92%	(20)
Switzerland	6.31%	(20)	6.41%	(20)	5.88%	(20)	6.28%	(20)	6.06%	(21)	5.76%	(21)	6.22%	(21)
United States	5.33%	(22)	5.37%	(22)	5.08%	(21)	4.76%	(22)	5.01%	(22)	4.79%	(22)	5.10%	(22)
Japan	4.94%	(23)	4.52%	(23)	3.72%	(23)	4.25%	(23)	3.92%	(23)	4.17%	(23)	4.37%	(23)
Unw. Av.	10.09%		10.83%		10.29%		10.86%		11.45%		11.65%		11.77%	
W. Av.	7.73%		7.82%		7.05%		7.28%		7.58%		7.58%		7.87%	

Note: The ranking is shown between brackets. Source: OECD *Revenue Statistics*.

modity taxes, namely the rate of taxation is inversely related to the elasticity of demand for a commodity. The literature on optimality conditions for other taxes has evolved along these lines. In general the conditions for optimality are minimization of the aggregate deadweight loss for any given tax revenue or level of public expenditure (Sandmo, 1976). From an efficiency point of view, a tax system is ideal if it is consistent with a Pareto optimal allocation of resources. In other words, a lump sum tax system is optimal since it does not distort marginal conditions. It is however often ruled out, both on efficiency and on equity grounds. For an overview of the theoretical developments on the tax mix, based on optimality properties, see, for example, Stiglitz (1987), and Boadway et al. (1994).

The considerations from the optimal taxation theory however are likely to be not the only considerations in developing a tax structure. As is well known from the literature on the determination of budget deficits, a normative analysis alone cannot provide ample explanation for reality, see, for example, Alesina and Perotti (1995) for an overview. Political and institutional factors play an important role in determining deficits. There is also some similar research on the tax mix. Among those studies are Pommerehne and Schneider (1983), Hettich and Winer (1984 and 1988), Hunter and Nelson (1989), Warskett et al. (1996), and Devereux and Wen (1998).[5]

Pommerehne and Schneider (1983) develop and test a model of a monopolistic government that can influence its chance of re-election by the shape of the tax structure. The government has an 'incentive' to pursue its ideological goal. Its ability to do so is however limited by considerations of popularity. In order to win an election, they have to favour a majority of voters. One instrument to influence its popularity is the shape of the tax system. The scope of their study is limited since they focus on Australia during the seventies,

[5]Hettich and Winer (1997) give a short overview of the empirical literature related to the political determination of the tax structure.

a country with a typical institutional framework and a bipolar political system. Still, they do come up with some interesting results. They find that the popularity of the government is negatively influenced by the total tax burden and also by the share of direct taxes in total revenue. The share of indirect taxation, that is much less visible, hardly affects popularity. Furthermore the authors test whether the government pursues its ideological goal. They find that right-wing governments tend to lower direct taxes and the tax-to-GDP ratio, whereas left-wing governments tend to raise indirect taxes and the tax-to-GDP ratio. Right-wing governments also lower indirect taxes, whereas left-wing governments also raise direct taxes.

Hettich and Winer (1984) propose and test a model that explains the reliance of US states on income taxation as a percentage of total tax revenue as an equilibrium outcome of political self-interest. The model is set up such that political actors minimize the political costs of different kinds of taxation, given a certain level of revenue. The political costs are made up of five different 'variables'. (i) Opposition to a tax depends on the effective tax-price, not on the nominal price. This is tested by adding the extent of tax shifting as an explanatory variable. (ii) The higher the revenue from a specific tax base is, the higher the opposition to that tax will be. (iii) The political costs associated with a tax are increasing more than one-to-one as revenue rises. (iv) The tax system in 'competing' units serves as a constraint on the tax system. (v) The higher the degree of uncertainty with respect to tax revenue from a source is, the higher the opposition to a tax on that source will be. The model is tested on a cross section of U.S. states by a Tobit-model. The results support the model, although the coefficient on the tax competition variable is not significant.

The theoretical model put forward by Hettich and Winer (1988) starts by assuming that voters support the government on the basis of the benefits

they get and the taxes they pay. The treatment of other taxpayers is irrelevant and the connection between their tax burden and the services provided to them is fuzzy. Voter's support for the government is a function of the benefit from public goods, the loss in full income from taxation and the associated deadweight loss. All variables are increasing in the tax rate. Furthermore, the tax rate is proportional. The government chooses the level of expenditures and the level of taxes so as to maximize the expected political support, subject to the government budget constraint and subject to the behaviour of the economic agent to the amount of the public good provided and the tax rates faced. The first order conditions amount to equalization of the marginal benefit of extra expenditure to the marginal cost of additional revenues.

Hunter and Nelson (1989) develop a model with only consumption taxes. The price to a consumer of the tax is increasing in his consumption level of that good and negatively related to the share of that good in total taxation. Interest groups, like homeowners, can influence the tax structure by lobbying activities and thus influence their relative price of taxation. This theoretical model is used to explain the variation in reliance on sales and property taxes and on user fees in local governments in Louisiana. The interest groups are farmers, timber producers, landlords and wealthy homeowners. These groups all benefit from a reduction in reliance on property taxation. Other variables used in the regressions are variables that affect the tax base and other variables like whether or not the entity borders another state, the population density and the number of public hospitals. The model is tested by OLS on a cross section of entities. The interest groups do significantly influence the share of property taxation in total revenues. Due to the scope of our study, we do not elaborate on these points any further.

Warskett et al. (1997) also study the complexity of the tax system in a

framework that is very much related to the one in Hettich and Winer (1988) of political competition. Political parties struggle for office and the presence of administration costs in taxation and self-selection leads to a complex tax system. One problem with the model is however that in equilibrium there are no differences anymore between the incumbent and the opposition party.

Devereux and Wen (1998) argue that political instability will lead to higher capital taxation. They develop a very simple model where capital is the only productive factor. In the absence of political instability, the government will only tax capital in the initial period to finance its outlays in all other periods. An incumbent government that faces an uncertain future will, however, tax capital and engage in higher spending, thus running a deficit, in order to restrict the spending options for the challenging government that is worthless to the incumbent. Its' successor will have to levy more capital taxes then in the absence of political instability. Devereux and Wen find a positive impact of political instability on the share of government spending in GDP, and refer to the observed negative relation between political instability and average growth rates.

4 Models and Hypotheses

This section first presents our considerations for including certain variables in our empirical models for the tax ratio and the tax mix. Next we will formulate the hypotheses that will be tested in the next section.

As a first step we have tried to analyse what would happen if government would refrain from changing tax rates, allowances, etc. in order to get an idea which factors would affect tax receipts. Personal income tax ratios will increase with *inflation* and *real growth* (Messere, 1993). Because of the progressivity of tax schedules, taxpayers will move into higher rate brackets

and those with incomes previously too low to pay will be brought into the tax net (so-called bracket creep).

According to Messere (1993), social security ratios decrease with inflation, since in most countries there is a ceiling on earnings subject to contributions and once this ceiling is passed the marginal rate of contributions is zero and the average rate begins to fall. It seems likely that higher economic growth rates will reduce the demand for social security benefits and thereby reduce social security ratios. General consumption tax ratios will remain broadly unaffected by inflation[6], since they are based on the value of goods and services, but increased growth could have a positive effect through higher consumption (Messere, 1993). It follows from the preceding analysis that the *a priori* effects of inflation and real growth on the total tax ratio are undetermined.

It seems likely that the *participation rate* – that is the part of the labour force which is actually employed – and the *share of elderly* in the total population will affect the social security ratio. The higher the participation rate, the lower is the need for benefits, while at the same time more people can contribute to the financing of social security. We therefore expect a negative relationship between participation and the social security ratio. A higher share of people of age 65 or above implies more social security benefits and therefore, *cet. par.*, a higher ratio. If other taxes are not affected, these factors would also affect the total tax ratio.

Messere (1993) reports that various "fishing expeditions" were carried out in the OECD and IMF to see if statistically and explanatory significant correlations emerged between tax levels and tax structures on the one hand, and some other variables on the other. One question that arose is whether

[6]However, Messere (1993) also argues that excise ratios will decrease with inflation as they are mostly levied on weight or volume. As both taxes are included in our category taxes on goods and services, it is possible that inflation will not be significant in our regressions.

there are competing sources of tax revenue so that governments having a high tax type A ratio in practice have a low tax type B ratio? According to Messere (1993) two potentially *competing tax ratios* would be that of personal income tax and social security contributions. He reports that in two-thirds of OECD countries with an above average ratio in one of these levies this is accompanied by a below average ratio in the other.

Governments of countries with small relatively open economies are often obliged for competitive reasons to follow the lead of other countries. However, according to Messere (1993) there is not much evidence to suggest that until now increasing economic integration has had much effect on the tax mix of OECD countries. Still, we include a measure of *openness* as explanatory variable in all models. Countries, which are members of the European Community, have to modify part of their tax system to conform to EC Directives. We therefore include a dummy for *EC membership*.

Messere (1993) also found that most countries with high *total tax ratios* had high consumption tax ratios. Messere does not provide any explanation for his findings. However, some scholars have argued that visibility of taxes may be the relevant explanation here. Wagner (1976) reports that the degree of complexity of a tax system is likely to blur the assessment of the degree of extraction by the government. If the number of taxes increases, and at the same time the associated rates go down, the overall assessment of taxes is likely to go down. To measure the degree of complexity of the tax system, he created a Herfindahl index of tax system complexity. This index is a measure for the number of revenue categories, which indicate the degree of complexity.[7] Wagner claims that indirect taxation is in general less visible than direct (or: income) taxation, but the degree of visibility of, for example,

[7]See Oates (1988) for an overview of subsequent developments in this literature. Ashworth and Heyndels (1998) investigate the impact of political and institutional political sources for the volatility of this index.

VAT and sales taxes can differ depending on the method of imposition. The same argument of course holds for direct taxation, but to a lesser extent.

So our first hypothesis is:

(1) The higher the share of taxes in national income, the higher the share of indirect taxes in total tax revenue will be since indirect taxes are less visible.[8]

In our specification for the other distinguished tax categories we also include the total tax ratio as explanatory variable, as Messere also found that for the ratios of taxes on incomes and profits, and of security taxes, there is a correlation with total tax ratios for around two thirds of countries.

Our second hypothesis relates to the political colour of the government. Various views have been put forward in this respect:

(2a) Left-wing governments rely more heavily on indirect taxation.

A reason is that these are less visible and left-wing government in general tend to have a higher level of tax-to-GDP ratio. However, Messere (1993) argues that right of centre governments have generally tended to favour a lower tax burden and consumption taxes rather than income taxes, whereas left of centre governments have tended to favour increasing the size of government, accepting that this may require higher taxes and especially higher income taxation. So, alternatively, we formulate the hypothesis as:

(2b) Left-wing governments rely more heavily on personal income taxation and social security contributions.

[8]See, for example, Hettich and Winer (1984), and Cullis and Jones (1987) who report the outcomes of a survey under UK citizens to study the degree of comprehension of UK economic affairs. The respondents were asked to whether they knew where governments get the money to pay for service from. Topping the list was income taxation, whereas indirect taxation was mentioned much fewer times.

Although it is *a priori* not clear what the effect of the political orientation of government will be on the tax mix, there is a widespread belief that the tax ratio will be higher under left of centre governments (see e.g. Messere, 1993).

It has been argued that governments that are very unstable are not able to cut expenditures or increase taxes, and thus have a deficit bias (De Haan and Sturm, 1994). The basic reasoning in this type of models is that deficits may be an easy way out.[9] In a similar way, it could be argued that increasing taxes (or: certain taxes) is more easy than decreasing government spending in case a government has to take fiscal austerity measures. Reducing government spending requires a strong government. This may imply that unstable regimes may have higher tax ratios. Similarly, it could be argued that unstable governments would rely more on invisible taxes. It is also argued that minority and coalition governments have a hard time to agree upon necessary expenditure cuts and therefore also run higher deficits[10] and similarly, may have a higher tax burden and higher invisible taxes. So, we formulate our third hypothesis as:

(3a) Unstable governments rely more heavily on taxation on goods and services, and

(3b) unstable governments have a higher tax-to-GDP ratio.

We have constructed several variables to test the hypotheses 2 and 3. The indicators *right*, *rightr*, *left*, and *leftr* indicate the presence of a right-wing or a left-wing government. These variables are used to check for the impact of the ideology of a government on the observed tax ratio and tax mix. *Right* indicates the presence of a right-wing dominated government and / or

[9] An alternative reasoning is that deficits may be used by government to reduce policy options for its successor which has different priorities; see e.g. Persson and Svensson (1989).

[10] The empirical evidence presented by Roubini and Sachs on the impact of the type of government on the growth of government debt has, however, been challenged by De Haan and Sturm (1997) and De Haan et al. (1998).

parliament, and *rightr* applies an even stricter definition of right-wing dominance.[11] The same reasoning holds for *left* and *leftr*. The variables *change* and *numgov* indicate the degree of political instability. *Numgov* is the actual number of governments present in one year, whereas the variable *change* is a dummy that takes value 1 if there is any change in government for a given year. The variables *coa*, *min*, and *maj* indicate the presence of a coalition government, a minority government, and a single-party majoritarian government, respectively. See the Appendix for more details.

5 Empirical Results

We have applied a fixed effects panel data model with weighted least squares estimation on a panel of 21 OECD countries.[12] We use WLS because – as the panel is unbalanced – some observations (mainly for Iceland, and the Southern European countries) are missing. A fixed effects model is usually applied in a panel set on a sample of countries.[13]

First, we have tested a specification to explain the change in *tax ratio*. Basic right-hand side variables are the rate of real GDP growth, and the rate of inflation. This specification is very similar to the one used in Kontopoulos and Perotti (1998).[14] We expect GDP growth to have a negative coefficient since it is hypothesized that it lowers both personal income taxation

[11] The variable *right* is 1 if right-wing or centre parties make up between 33.3% and 66.6% of government; the variable *rightr* is 1 if there is right-wing domination in both government and parliament.

[12] We have excluded the US and Switzerland from our sample because our focus is on parliamentary democracies. The democratic constellation of the US and Switzerland differs so much from the other countries that we have excluded them from our sample. For a similar reason, we have excluded Greece, Portugal, and Spain during their non-democratic years.

[13] The standard FE model looks like $y_{it} = \alpha_i + x'_{it}\beta$. The specification we have estimated is $\Delta y_{it} = \Delta x'_{it}\beta$, and includes a vector of the political and institutional dummies. For a similar application see Ashworth and Heyndels (1998).

[14] Unlike Kontopoulos and Perotti, we do not include the rate of unemployment since real GDP growth and unemployment are highly correlated.

Table 3: Regression results, tax ratio, basic specification

variable	sample 1965-1995	sample 1965-1973	sample 1974-1983	sample 1984-1995
country dummies	no	no	no	no
d π	0.05	0.08	0.03	0.04
	(2.29)	(1.37)	(0.87)	(1.24)
d y	-0.09	-0.05	-0.10	-0.07
	(-4.20)	(-1.17)	(-2.81)	(-2.17)
d open	-0.01	0.02	-0.01	-0.03
	(-0.46)	(0.53)	(-0.48)	(-1.49)
Europe	0.00	0.00	0.00	0.00
	(3.45)	(0.89)	(2.85)	(1.42)
d elderly	0.91	1.14	1.21	0.71
	(3.13)	(1.66)	(2.20)	(1.74)
d emp-pop	0.03	0.18	0.14	0.03
	(1.17)	(0.89)	(0.84)	(1.04)
$\bar{R}^2$	0.037	-0.136	0.047	0.053
# obs.	501	98	177	227

Note: dependent variable is the change in tax ratio (d ty), estimation is FE with WLS, outliers are removed, t-values are shown between brackets.

and taxation on goods and services, whereas the sign of the coefficient on inflation is not *a priori* clear. We have used a specification in first-differences to separate out the fixed country constants. The results – not reported here – are not very convincing. The $\bar{R}^2$ is negative and only the coefficient for real GDP growth is significant. Therefore, we have reestimated the model including the following: the participation ratio, the share of elderly, a European Union dummy, and the degree of openness of the economy. This specification yields somewhat better results. They are shown in the first column of Table 3. Country dummies are not included as the hypothesis that they are equal is not rejected. Outliers are removed from the sample if their standard deviation exceeds 3 times the confidence interval, but this does not materially affect the results. The coefficient of the growth rate is significant and has the expected sign (a minus). The coefficient of the rate of inflation

is significant, and positive. The coefficient of the Europe dummy (positive), and the coefficient of the share of elderly (positive) are also significant. The coefficients of the degree of openness and of the proxy for the participation ratio are not significant. The $\bar{R}^2$ is still not very high, but this is in line with the results obtained by Kontopoulos and Perotti (1998).[15].

Next, we have included our additional political and institutional variables one at a time. The results from adding these variables are in the first columns of Table 4. Both left- and right-wing governments have a positive and significant impact on the tax ratio, so have the presence of a single-party majoritarian government and both indicators of political instability. The effect of both left- and right-wing governments on the tax ratio is puzzling, since the effects are both positive and significantly different from zero. A more detailed analysis is clearly warranted. We have therefore – in line with the arguments by Kontopoulos and Perotti (1998) – split up the sample into three submersions. These are 1965-1973, up to the first oil-crisis; 1974-1983, the end of this period marks the end of the world-wide recession and the second oil crisis; and 1984-1995, a period of fiscal consolidation in most countries. As Kontopoulos and Perotti (1998) argue, policymakers faced widely different problems in these subsequent periods, and the response to these circumstances may have been very much different. The impact of the different political and institutional variables, may therefore have been different in those periods. The results for the subperiods are in columns two to four in Table 3 and Table 4. The explained variation for the basic model in the periods 1965-1973 and 1984-1995 increases, whereas the specification for 1974-1983 performs very badly.

[15]If we add the variable *agri*, the share of agricultural value added in total value added, a factor introduced by Musgrave (1969), and also used by Abizadeh and Gray (1985) in their (empirical) study of Wagner's law, the fit improves markedly. The $\bar{R}^2$ doubles to 0.067, and the variable *agri* is highly significant, and negative as should be expected. The sign and significance of the other variables do not change radically.

Table 4: Regression results tax ratio, added variables

	sample period							
variable	1965-1995	dummies	1965-1973	dummies	1974-1983	dummies	1984-1995	dummies
right	+/5%	n	+/10%	n	+/1%	n	+/1%	n
rightr	n	n	+/10%	n	+/1%	n	+/10%	n
left	+/1%	n	+/5%	n	+/1%	n	+/5%	n
leftr	+/5%	n	+/5%	n	+/1%	n	+/10%	n
coa	n	n	n	n	+/1%	n	n	n
min	n	n	n	n	+/1%	n	n	n
maj	+/5%	n	n	n	+/1%	n	n	n
change	+/5%	n	+/10%	n	+/1%	n	+/5%	n
numgov	+/5%	n	+/1%	n	+/1%	n	+/1%	n

Note: n denotes no, y denotes yes, a '+' denotes a positive coefficient, a '−' a negative one, a percentage denotes the significance level. Also see note to Table 3.

The results in Table 4 indicate that the during the late sixties and early seventies, the variables *left* and *leftr*, both indicators for the presence of a left-wing dominated government, showed up significantly and with a positive coefficient. Hence, left-wing governments increased taxes more than other governments. Both *change* and *numgov* were also significant, and positive, indicating that frequent government changes also contributed to a higher tax-to-GDP ratio. This effect is also present in the late eighties, early nineties period. For the late seventies and early eighties, the model did not perform well. With respect to the late eighties, early nineties period, both variables indicating the presence of right-wing and left-wing governments showed up significantly. This is surprising, but the results are not very robust: if the more stringent definitions of the political variables are used, the effect vanishes. The coefficient of both indicators for political instability were significant and positive in this period.

We have also estimated the model using one-period lagged political and institutional variables. We have done this because political changes might not instantly affect the revenue structure, since the actions of the new government are restricted by the existing budget. The results are in Table 5. The main difference to the basic regression is that the effect of right-wing governments vanishes. The other variables are robust to these changes.

In line with the specification of Kontopoulos and Perotti (1998), we have also experimented by including an interaction variable of the political / institutional variable with the growth rate of real GDP in the regressions. The results from this exercise are not reported here as the results do not differ very much from the results obtained above. In case the coefficient of a variable was significant in one of the regressions, it remained so, the interaction in that case was – in most of the cases – not significantly different from zero.

Table 5: Regression results tax ratio, added lagged variables

	sample period							
variable	1965-1995	dummies	1965-1973	dummies	1974-1983	dummies	1984-1995	dummies
right (-1)	+/10%	n	+/10%	n	n	n	n	n
rightr (-1)	n	n	n	n	n	n	n	n
left (-1)	+/10%	n	+/5%	n	n	n	n	n
leftr (-1)	+/10%	n	+/10%	n	n	n	n	n
coa (-1)	+/5%	n	+/1%	n	n	n	n	n
min (-1)	n	n	+/10%	n	n	n	n	n
maj (-1)	n	n	n	n	n	n	n	n
change (-1)	+/1%	n	n	n	n	n	+/5%	n
numgov (-1)	+/1%	n	+/1%	n	+/10%	n	+/5%	n

Note: n denotes no, y denotes yes, a '+' denotes a positive coefficient, a '−' a negative one, a percentage denotes the significance level.

Table 6: Regression results tax-mix, basic specification

	dependent variable					
variable	d p.i.t.		d s.s.c.		d t.g.s.	
Country dummy	no		no		no	
d π	0.006	(0.70)	-0.004	(-0.62)	-0.014	(-1.87)
d y	-0.015	(-1.95)	-0.018	(-2.81)	0.019	(2.34)
d two	-0.485	(-11.72)	-		-	
d open	0.002	(0.50)	-0.003	(-0.97)	-0.009	(-2.02)
d TY	0.483	(26.64)	0.274	(14.81)	0.222	(15.90)
Europe	0.000	(-0.03)	0.000	(1.91)	-0.000	(-0.78)
d emp-pop	-		-0.009	(-1.03)	-	
d elderly	-		-0.139	(-1.51)	-	
d one-one	-		-0.245	(-7.92)	-	
R^2	0.57		0.34		0.31	

Note: p.i.t.: personal income taxation; s.s.c.: social security contributions; t.g.s.: taxation on goods and services. t-statistics are shown in brackets. Outliers are removed from the sample. Estimation is by WLS to correct for unbalanced sample. Also see the note to Table 3.

Next, we have tested our hypotheses regarding the *tax mix*. Again, the estimation is by fixed effect with weighted least squares to correct for the unbalanced sample. The specification is in line with the specification used by Kontopoulos and Perotti (1998). Our main results are in Table 6. Country dummies are not included in the regression. We have tested whether country dummies should be included in the regression by testing whether all country dummies are equal. In all cases this restriction could not be rejected, at the usual significance level. Large outliers can affect the results from the regressions and are excluded if too large. Exclusion does not materially affect the results.

The results support our initial beliefs with respect to the (economic) variables that matter for the shape of the tax mix. With respect to the specification for personal income taxation, the coefficients for social security contributions, and total taxation have the expected sign and are significantly different from zero. The coefficients on inflation, real growth, openness and the Europe dummy are not significantly different from zero. With respect to the

specification for social security contributions, the coefficients of real growth, personal income taxation, and the total tax ratio have the expected sign and are significant. The other coefficients are not significant. With respect to the specification for taxation on goods and services, real growth, the total tax ratio, and openness are significant and show the expected sign. Openness lowers reliance on taxation on goods and services. The coefficients of the other variables are not significantly different from zero. We have included the tax ratio as a dependent variable in all regressions on the tax mix. It is possible that this variable picks up the impact of political and institutional factors on the tax mix. Therefore, we have also estimated the model excluding the tax ratio as a dependent variable. This generally does not affect the main conclusions.[16]

Next we have included the additional variables to test the hypotheses. The results are in Table 7. They indicate that right-wing governments tend to increase both personal income taxation and social security contributions, although the effect of more pronounced right-wing governments is less significant for personal income taxation. The same effects can be observed for both coalition and single-party majoritarian governments. The variable *numgov* is also significant (and positive) but the variable *change* is not. The results concerning political orientation are not very surprising since, as argued in hypothesis 2, the impact of, for example, political colour, may work in both ways.

We have also experimented with the one-period lagged values of the political and institutional variables. (Table 8). The results show a mitigation of the effect of right-wing governments. Most variables are still insignificant.

[16]It does affect the results for the specification on taxation on goods and services in some instances. These results do not seem to be robust, however. The coefficients are either not very significant (only at a 10% level) or the coefficients of more strict definitions (like *left* versus *leftr*) are not significant.

Table 7: Regression results tax mix, added variables

	dependent variable					
variable	d p.i.t.	country dummy	d s.s.c.	country dummy	d t.g.s.	country dummy
right	+/5%	n	+/5%	n	n	n
rightr	+/10%	n	+/5%	n	n	n
left	n	n	n	n	n	n
leftr	n	n	n	n	n	n
coa	+/10%	n	+/5%	n	n	n
min	n	n	n	n	−/10%	n
maj	+/10%	n	+/5%	n	n	n
change	n	n	n	n	n	n
numgov	+/5%	n	+/5%	n	n	n

Note: n denotes no, y denotes yes, a percentage denotes the significance level, a '−' denotes a negative coefficient.

Table 8: Regression results tax mix, added lagged variables

	dependent variable					
variable	d p.i.t.	country dummy	d s.s.c.	country dummy	d t.g.s.	country dummy
right (-1)	+/5%	n	n	n	n	n
rightr (-1)	n	n	n	n	n	n
left (-1)	n	n	n	n	n	n
leftr (-1)	n	n	n	n	n	n
coa (-1)	+/10%	n	+/10%	n	n	n
min (-1)	n	n	n	n	−/5%	n
maj (-1)	+/10%	n	+/10%	n	n	n
change (-1)	n	n	n	n	n	n
numgov (-1)	+/1%	n	+/1%	n	−/10%	n

Note: n denotes no, y denotes yes, a percentage denotes the significance level, a '+' denotes a positive coefficient, a '−' a negative one.

The results for political instability are still puzzling, since the coefficient of one indicator is significant and the coefficient of the other is not.

We have also experimented with the inclusion of an interaction term with the growth rate in addition to the regular political or institutional indicator in the regressions. The results are shown in Table 9. It is indicated that in the presence of higher growth, right-wing governments tend to raise taxation on goods and services, whereas left-wing governments tend to decease these taxes. Coalition and single-party majoritarian governments tended to have higher and lower social security contributions, respectively, in the face of higher growth. Moreover, right-wing and left-wing governments tended to treat taxation on goods and services in opposite ways if confronted with higher growth. Right-wing governments raise indirect taxes, and left-wing governments tend to lower these. The most important point is that the result obtained before are robust to the addition of an interaction variable.

In order to get a better view on the underlying motions, we have split up the sample, in line with the exercises for the tax ratio, into the periods 1965-1973, 1974-1983, and 1984-1995. The results for the basic model are comparable to the ones obtained for the full sample, hence, we do not report the results here. The major results for the political and institutional variables are shown in Table 10. The major changes are the mitigation of the effect of right-wing governments for personal income taxation. The effect on social security contributions of these governments mainly stems from the period between the two oil crises. In this period, the main effects of the type of government can be found for social security contributions, whereas this position affects personal income taxation in the first subperiod. The effect of political instability – as indicated by the variables *change* and *numgov* – is puzzling. One of the variables has a positive impact on personal income taxation in the early seventies, whereas the other has a negative impact.

Table 9: Regression results tax mix, added variables and an interaction term

	dependent variable								
variable	d p.i.t.	int	dummy	d s.s.c.	int	dummy	d t.g.s.	int	dummy
right	+/5%	n	n	+/5%	n	n	n	+/1%	n
rightr	+/5%	n	n	+/5%	n	n	n	+/1%	n
left	n	n	n	n	n	n	n	−/5%	n
leftr	n	n	n	n	n	n	n	−/5%	n
coa	+/5%	n	n	+/5%	−/5%	n	n	n	n
min	n	n	n	n	n	n	−/10%	n	n
maj	+/10%	n	n	+/5%	+/5%	n	n	n	n
change	n	n	n	n	n	n	n	n	n
numgov	+/5%	n	n	+/1%	n	n	n	n	n

Note: n denotes no, y denotes yes, a percentage denotes the significance level, a '+' denotes a positive coefficient, a '−' a negative one.

Table 10: Regression results tax mix, added variables, subperiods

	period								
	1965-1973			1974-1983			1984-1995		
variable	d p.i.t.	d s.s.c.	d t.g.s.	d p.i.t.	d s.s.c.	d t.g.s.	d p.i.t.	d s.s.c.	d t.g.s.
right	n	n	n	+/10%	+/1%	n	n	n	n
rightr	n	n	n	n	+/5%	n	n	n	n
left	+/10%	n	n	n	n	n	n	n	n
leftr	n	n	n	n	n	n	n	n	n
coa	+/5%	n	n	n	+/5%	n	n	n	n
min	n	n	n	n	−/1%	n	+/10%	n	n
maj	+/5%	+/10%	n	n	+/5%	n	n	n	n
change	−/5%	n	n	n	n	n	n	n	n
numgov	+/5%	n	n	n	n	n	n	n	n

Note: n denotes no, y denotes yes, a percentage denotes the significance level, a '+' indicates a positive number, and a '−' denotes a negative number.

In conclusion, with respect to the hypotheses stated in section 4, hypothesis 1 can be confirmed. The last column of table 6 shows that the tax ratio is highly significant in the regression on indirect taxation (taxation on goods and services). With respect to hypothesis 2, there does not seem to be an influence of left-wing governments on the tax mix, whereas, with regard to hypothesis 3, unstable governments do seem to have a higher tax ratio over both the full sample period and especially over the first and last subperiod. Unstable governments do not seem to have an effect on the relative share of indirect taxation. However, unstable regimes have a higher tax burden

6 Concluding Remarks

In this paper, we have developed and tested some hypotheses regarding the influence of political and institutional variables on the tax ratio and on the shape of the tax mix of OECD countries. With respect to the tax ratio, the only effects we find are that left-wing governments tended to increase taxes more rapidly than other government during the late sixties and early seventies, and that political instability was a source of increased taxes in the late sixties and early seventies and in the late eighties and early nineties. We have argued that left-wing governments may tend to rely more heavily on direct or indirect taxation. These forces may just cancel out, and this is probably what we find here. With respect to the tax mix, we find that right-wing governments tended to increase the share of personal income taxation, and social security contributions, but this effect mainly stems from the period between the two oil crises. Our main conclusion is therefore that political and institutional factors are not important explanatory factors for the actual shape of the tax mix. And, we also conclude that the impact of political orientation of

government on the tax ratio is not stable over time.

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A The Data

The data on taxes we have are from the OECD Revenue Statistics, various issues. The panel consists of 21 OECD countries (excluding Switzerland and the US) and covers the period 1965 to 1995. Data are available from 1975 onwards for Greece, from 1985 onwards for Iceland, from 1976 onwards for Portugal and from 1977 onwards for Spain.

Data on the rate of unemployment, the rate of inflation and the rate of growth of real GDP are from various issues of the OECD Economic Outlook. The political data all come from Woldendorp et al. (1993) and updates as published in the *European Journal of Political Research*. Missing data are constructed using Keesing's Archive. The definition of the *POL*-index is derived from Roubini and Sachs (1989). The variable *POL* takes the value 0 if there is a single party majoritarian government in power, 1 or 2 if there is a coalition government in power consisting of 2 to 3 or 4 or more parties, respectively, and takes the value 3 if there is a minority government in power. From this *POL* variable we can construct *min* and *maj*, indicating the presence of a minority or a majority government, respectively (see also De Haan and Sturm, 1997). The variable *numgov* is the total number of governments present during one year, and is taken from Woldendorp et al. (1993). The variable *CPG* takes the value 1 if there is right-wing domination in both government and parliament; it takes the value 2 if right-wing or centre parties make up between 33.3% and 66.6% of government; it takes the value 3 if centre parties make up 50% or more of government; it takes value 4 if left-wing or centre parties make up between 33.3% and 66.6% of government; and takes the value 5 if left-wing parties dominate the government. The distinction between left-wing, centre, and right-wing parties is also taken from Woldendorp et al. (1993). The variable *right* takes the value 1 if CPG=1,2.

Alternatively the variable *rightr* takes the value 1 if CPG=1. *Left* and *leftr* are constructed similarly with values for CPG of 4, and 5, and 5, respectively.

Tables 11-13 show our political and institutional dataset. From these variables, one can compute all other variables used in the analysis.

The variable *agri* is the share of agricultural value added in total value added, and is taken from OECD *Historical Statistics*. The variable *open* is defined as the share of imports and exports in GDP, based on IMF, *International Financial Statistics*. The variable *emp-pop* is defined as the ratio of civilian employment to the total population, and is taken from OECD *Labor Force Statistics*. We include this variable since participation ratios are not available in a satisfactory frequency.

Table 11: Overview of variable *POL* per year per country

POL	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Australia	1	1	1	1	1	1	1	1	0	0	0	1	1	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Austria	1	0	0	0	0	3	3	0	0	0	0	0	0	0	0	0	0	0	1	1	1	3	1	1	1	1	1	1	1	1	1
Belgium	1	1	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2
Canada	3	3	3	3	0	0	0	0	3	3	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Denmark	3	3	3	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	2	3	3
Finland	2	2	2	2	2	2	2	3	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	2
France	1	1	1	1	1	1	1	1	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	3	3	3	3	3	1	1	1
Germany	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Greece	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
Iceland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	1	3	2	1	1	1	1	1
Ireland	0	0	0	0	0	0	0	0	1	1	1	1	1	0	0	0	3	3	1	1	1	1	3	3	3	1	1	1	1	1	1
Italy	2	2	2	2	1	2	1	1	1	1	3	3	3	3	3	1	2	2	2	2	2	2	2	2	2	2	2	2	2	1	3
Japan	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	3	0	0	0	1	1	1	0	0	0	0	0	0	2	1	1
Luxembourg	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
The Netherlands	1	1	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1
New Zealand	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3
Norway	3	2	2	2	2	2	3	3	3	3	3	3	3	3	3	3	3	3	1	1	1	3	3	3	3	3	3	3	3	3	3
Portugal	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	0	0	0	3	1	1	1	1	1	1	3	3	0	0	0	0	0	0	0	0
Spain	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	0	0	3	3	3	3	0	0	0	0	0	0	0	0	0	0	0	3	3
Sweden	3	3	3	3	0	0	3	3	3	3	3	3	1	1	3	1	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
Switzerland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
United Kingdom	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
United States	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note: definition taken from Roubini and Sachs (1989); data taken from De Haan and Sturm (1997); nr denotes not relevant, a – denotes not available, not in sample.

Table 12: Overview of variable *CPG* per year per country

CPG	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Australia	1	1	1	1	1	1	2	2	5	5	5	1	1	1	1	1	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5
Austria	3	1	1	1	1	4	4	5	5	5	5	5	5	5	5	5	5	5	4	4	4	4	3	3	3	3	3	3	3	3	3
Belgium	3	2	2	3	3	3	3	3	3	1	1	1	3	3	3	3	3	1	1	1	1	1	1	3	3	3	3	3	3	3	3
Canada	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Denmark	5	5	5	1	1	1	1	5	5	1	5	5	5	5	4	5	5	5	1	1	1	1	1	1	1	1	1	1	4	4	4
Finland	1	3	3	3	3	3	3	4	3	3	3	3	2	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3
France	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	5	5	5	5	5	2	2	5	5	5	5	1	1	1	1
Germany	1	1	3	3	3	4	4	4	4	4	4	4	4	4	4	4	4	4	1	1	1	1	1	1	1	1	1	1	1	1	1
Greece	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	1	1	1	1	1	1	1	5	5	5	5	5	5	5	3	1	1	1	1	5	5
Iceland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	1	3	3	3	3	3	3	3	1
Ireland	1	1	1	1	1	1	1	1	2	2	2	2	2	1	1	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2	3
Italy	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	2	2	2	2	2	2	2	2	2	2	2	2	2	2	1	4
Japan	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	2	2
Luxembourg	3	3	3	3	1	1	1	1	1	3	3	3	3	3	3	1	1	1	1	1	3	3	3	3	3	3	3	3	3	3	3
The Netherlands	1	1	1	1	1	1	1	1	3	3	3	3	3	1	1	1	1	2	1	1	1	1	1	1	1	3	3	3	3	3	3
New Zealand	1	1	1	1	1	1	1	2	5	5	4	1	1	1	1	1	1	1	1	1	5	5	5	5	5	5	1	1	1	1	1
Norway	5	1	1	1	1	1	4	4	2	5	5	5	5	5	5	5	4	1	1	1	1	5	5	5	5	5	5	5	5	5	5
Portugal	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	1	1	1	1	1	1	1	3	3	3	1	1	1	1	1	1	1	1	1	1
Spain	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	1	1	1	1	1	1	5	5	5	5	5	5	5	5	5	5	5	5	5
Sweden	5	5	5	5	5	5	5	5	5	5	5	5	1	1	1	1	1	1	5	5	5	5	5	5	5	5	5	1	1	1	5
Switzerland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
United Kingdom	5	5	5	5	5	1	1	1	1	5	5	5	5	5	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
United States	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note: derived from Woldendorp et al. (1993) and subsequent updates; nr denotes not relevant, a – denotes not available, not in sample.

Table 13: Overview of variable *numgov* per year per country

Numgov	1965	1966	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995
Australia	1	3	2	3	2	1	2	2	1	2	3	1	2	1	1	2	1	1	2	2	1	1	2	1	1	2	2	1	2	1	1
Austria	2	2	1	1	1	2	2	1	1	1	2	1	1	1	2	1	1	1	2	1	1	2	2	1	1	2	1	1	1	2	2
Belgium	2	2	1	2	1	1	1	2	2	3	1	2	2	2	2	4	3	1	1	1	2	1	2	2	1	1	1	2	1	1	2
Canada	2	1	1	2	1	1	1	2	1	2	1	1	1	1	2	2	1	1	2	2	1	1	1	1	2	1	1	1	2	1	1
Denmark	1	2	1	2	1	1	2	2	2	1	2	1	2	2	2	1	1	2	1	2	1	1	2	2	1	2	1	1	2	2	1
Finland	1	2	1	2	1	3	3	3	1	1	3	2	2	2	2	1	1	3	2	1	1	1	2	1	1	2	2	1	1	2	2
France	1	2	2	3	2	1	1	2	2	3	1	2	2	2	1	1	3	1	2	2	1	2	1	2	1	1	2	2	2	1	2
Germany	2	3	1	1	2	1	1	3	1	2	1	2	1	1	1	2	1	3	2	1	1	1	2	1	1	1	2	1	1	2	1
Greece	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	1	1	2	1	1	2	2	1	1	1	2	1	1	1	3	3	1	1	2	1	1
Iceland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	1	1	2	2	2	1	2	1	1	1	2
Ireland	2	2	1	1	2	1	1	1	2	1	1	1	2	1	2	1	2	3	1	1	1	1	2	1	2	1	1	2	2	2	1
Italy	1	2	1	3	2	3	2	3	2	3	1	3	1	2	3	3	2	3	2	1	1	2	3	2	2	1	2	2	2	2	2
Japan	1	1	2	1	1	2	1	3	1	2	1	2	1	2	2	2	1	2	2	2	1	2	2	1	3	3	2	1	2	3	1
Luxembourg	1	1	2	1	2	1	1	1	2	1	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1	1	1	1	2	1
The Netherlands	2	2	2	1	1	1	2	2	2	1	1	1	2	1	1	1	2	3	1	1	1	2	1	1	2	1	1	1	1	2	1
New Zealand	1	2	1	1	2	1	1	3	1	2	2	1	1	2	1	1	2	1	1	2	1	1	2	1	2	3	1	1	2	1	1
Norway	2	1	1	1	2	1	2	2	2	1	1	2	2	1	1	1	2	1	2	1	2	2	1	1	2	2	1	1	2	1	1
Portugal	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	2	1	1	2	2	3	1	2	1	2	1	2	1	1	1	2	1	1	1	2
Spain	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	nr	2	1	2	1	2	2	1	1	1	2	1	1	2	1	1	1	2	1	1
Sweden	1	1	1	2	2	2	1	1	2	1	1	2	1	2	2	1	2	2	1	1	2	2	1	2	1	2	2	1	1	2	1
Switzerland	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
United Kingdom	1	2	1	1	1	2	1	1	1	3	1	2	1	1	2	1	1	1	2	1	1	1	2	1	1	2	1	2	1	1	1
United States	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–

Note: derived from Woldendorp et al. (1993) and subsequent updates; nr denotes not relevant, a – denotes not available, not in sample.